

WHAT IS CLAIMED IS:

1 1. A system for adjusting display data orientation, said system including
2 graphics circuitry configured to send and receive control signals over a set of control lines,
3 said exchange governed by a communication protocol;

4 the graphics circuitry configured to request orientation information via the set
5 of control lines upon detecting a modulation of the set of control lines that is undefined by
6 said communication protocol; and

7 the graphics circuitry configured to adjust an orientation of display data by
8 reference to the orientation information upon receiving said orientation information via the
9 set of control lines.

1 2. The system of claim 1, wherein the set of control lines comprises a
2 data line and a clock line.

1 3. The system of claim 2, wherein the modulation comprises a
2 modulation of the data line.

1 4. The system of claim 2, wherein the modulation comprises a
2 modulation of the clock line.

1 5. The system of claim 2, wherein the modulation comprises an
2 adjustment of a state of the data line while the clock line is maintained in a logic HIGH state:

1 6. The system of claim 1, wherein the graphics circuitry comprises a
2 graphics card.

1 7. The system of claim 1, wherein the graphics circuitry is housed in a
2 computing device, said computing device generating the display data, said display data
3 transmitted over a data line separate from the set of control lines.

1 8. The system of claim 7, wherein
2 the set of control lines connect the graphics circuitry to a display device;
3 the data line also connects the graphics circuitry so that said display device
4 displays said display data.

1 9. The system of claim 8, wherein the display device comprises a cathode
2 ray tube display.

1 10. The system of claim 8, wherein the display device comprises flat panel
2 display.

1 11. The system of claim 1, wherein the communication protocol comprises
2 the digital display channel standard promulgated by the video electronics standards
3 association.

1 12. A system for processing orientation changes, said system including
2 a display device configured to communicate over a set of control lines in
3 accordance with a communication protocol;

4 the display device configured to detect a change in an orientation of said
5 display device; and

6 the display device configured to initiate a modulation of the set of control lines
7 that is undefined by said communication protocol upon detecting the change in the
8 orientation of said display device.

1 14. The system of claim 13, wherein the modulation comprises a
2 modulation of the data line.

1 17. The system of claim 12, wherein the display device comprises a
2 cathode ray tube display.

1 18. The system of claim 12, wherein the display device comprises flat
2 panel display.

1 19. The system of claim 12, wherein
2 the display device is connected via the set of control lines to graphics
3 circuitry; and
4 the graphics circuitry is configured to request orientation information from the
5 display device via the set of control lines upon detecting the modulation of the set of control
6 lines.

1 20. The system of claim 19, wherein
2 the graphics circuitry is housed in a computing device, said computing device
3 generating display data, said display data transmitted by said graphics circuitry over a data
4 line separate from the set of control lines.

1 21. The system of claim 20, wherein
2 the data line connects the graphics circuitry to the display device, said display
3 device displays said display data.

1 22. The system of claim 20, wherein
2 the graphics circuitry is configured to adjust an orientation of the display data
3 by reference to the orientation information following receipt of said orientation information
4 via the set of control lines.

1 23. The system of claim 12, wherein the communication protocol
2 comprises the digital display channel standard promulgated by the video electronics standards
3 association.

1 24. A system for processing display device orientation changes, said
2 system includes
3 a display device and graphics circuitry, said display device and said graphics
4 circuitry configured to exchange control signals over a set of control lines, said exchange
5 governed by a communication protocol;
6 the display device configured to detect a change in an orientation of said
7 display device;
8 the display device configured to initiate a modulation of the set of control lines
9 that is not defined by the communication protocol upon detecting said change in the
10 orientation of said display device;

11 the graphics circuitry configured to request orientation information from the
12 display device upon detecting the modulation of the set of control lines; and
13 the graphics circuitry configured to adjust an orientation of display data
14 transmitted to the display device by reference to the orientation information upon receiving
15 said orientation information via the set of control lines.

1 25. The system of claim 24, wherein the set of control lines comprises a
2 data line and a clock line.

1 26. The system of claim 25, wherein the modulation comprises a
2 modulation of the data line.

1 27. The system of claim 25, wherein the modulation comprises a
2 modulation of the clock line.

1 28. The system of claim 25, wherein the modulation comprises an
2 adjustment of a state of the data line while the clock line is maintained in a logic HIGH state.

1 29. The system of claim 24, wherein the graphics circuitry comprises a
2 graphics card.

1 30. The system of claim 24, wherein the graphics circuitry is housed in a
2 computing device, said computing device generating the display data, said display data
3 transmitted over a data line separate from the set of control lines.

1 31. The system of claim 30, wherein
2 the data line connects the graphics circuitry to said display device.

1 32. The system of claim 24, wherein the display device comprises a
2 cathode ray tube display.

1 33. The system of claim 24, wherein the display device comprises flat
2 panel display.

1 34. The system of claim 24, wherein the communication protocol
2 comprises the digital display channel standard promulgated by the video electronics standards
3 association.

1 35. A system for adjusting data orientation, said system including
2 graphics circuitry configured to send and receive control signals over a set of
3 control lines, said exchange governed by a master/slave communication protocol under which
4 said graphics circuitry is a lone master of said set of control lines;

5 the graphics circuitry configured to request orientation information via the set
6 of control lines upon detecting a modulation of the set of control lines that is undefined by
7 said master/slave communication protocol and not initiated by said graphics circuitry; and

8 the graphics circuitry configured to adjust an orientation of display data by
9 reference to the orientation information upon receiving of said orientation information via the
10 set of control lines.

1 36. A system for processing orientation changes, said system including
2 a display device configured to receive control signals over a set of control
3 lines in accordance with a master/slave communication protocol under which said display
4 device is a slave;

5 the display device configured to detect a change in an orientation of said
6 display device; and

7 the display device configured to initiate a modulation of the set of control lines
8 in violation of master/slave communication protocol upon detecting the change in the
9 orientation of said display device.

1 37. A system for processing display device orientation changes, said
2 system includes

3 a display device and graphics circuitry, said display device and said graphics
4 circuitry configured to exchange control signals over a set of control lines, said exchange
5 governed by a master/slave communication protocol under which said graphics circuitry is a
6 lone master of said set of control lines and said display device is a slave of said set of control
7 lines;

8 the display device configured to detect a change in an orientation of said
9 display device;

10 the display device configured to initiate a modulation of the set of control lines
11 in violation of said master/slave communication protocol upon detecting said change in the
12 orientation of said display device;

the graphics circuitry configured to request orientation information from the display device upon detecting the modulation of the set of control lines; and
the graphics circuitry configured to adjust an orientation of display data transmitted to the display device by reference to the orientation information following receipt of said orientation information via the set of control lines.

38. A system for adjusting display data orientation, said system including graphics circuitry configured to send and receive control signals over a set of control lines, said exchange governed by a communication protocol; the graphics circuitry configured to request orientation information via the set of control lines upon detecting a modulation of the set of control lines that is defined as an illegal operation by said communication protocol; and the graphics circuitry configured to adjust an orientation of display data by reference to the orientation information upon receiving said orientation information via the set of control lines.

39. A system for processing orientation changes, said system including a display device configured to communicate over a set of control lines in accordance with a communication protocol;

the display device configured to detect a change in an orientation of said display device; and

the display device configured to initiate a modulation of the set of control lines that is defined as an illegal operation by said communication protocol upon detecting the change in the orientation of said display device.

40. A system for processing display device orientation changes, said system includes

- a display device and graphics circuitry, said display device and said graphics circuitry configured to exchange control signals over a set of control lines, said exchange governed by a communication protocol;
- the display device configured to detect a change in an orientation of said display device;
- the display device configured to initiate a modulation of the set of control lines that is defined as an illegal operation by the communication protocol upon detecting said change in the orientation of said display device;

the graphics circuitry configured to request orientation information from the display device upon detecting the modulation of the set of control lines; and

the graphics circuitry configured to adjust an orientation of display data transmitted to the display device by reference to the orientation information upon receiving said orientation information via the set of control lines.

41. A communication channel comprising a data signal and a clock signal, wherein:

a start condition is indicated on the communication channel by a high-to-low transition of the data signal followed by a high-to-low transition of the clock signal;

a stop condition is indicated on the communication channel by a low-to-high transition of the clock signal followed by a low-to-high transition of the data signal; and

a state change in a slave of the communication channel is indicated on the communication channel by a pulse of the data signal while the clock signal is unchanged.

42. The communication channel of claim 41 wherein:

the pulse comprises a high-to-low transition followed by a low-to-high transition; and

the pulse occurs while the clock signal is high.

43. The communication channel of claim 42 wherein:

a master of the communication channel is a graphics circuit and the slave of the communication channel is a display.

44. The communication channel of claim 43 wherein:

the state change comprises a rotation of the display.

45. The communication channel of claim 41 wherein:

the data signal is high when neither the master nor the slave is driving the data signal; and

the clock signal is high when neither the master nor the slave is driving the clock signal.

46. The communication channel of claim 41 wherein:

2 a bit value of one is indicated on the communication channel by the data signal
3 being high while the clock signal has a low-to-high transition followed by a high-to-low
4 transition; and

5 a bit value of zero is indicated on the communication channel by the data
6 signal being low while the clock signal has a low-to-high transition followed by a high-to-low
7 transition.

1 47. The communication channel of claim 41 wherein:
2 the data signal is pulled up by a resistor; and
3 the clock signal is pulled up by a resistor.

1 48. A communication channel consisting of a serial data line (SDA) and a
2 serial clock line (SCL), wherein:

3 a start condition is indicated on the communication channel by a high-to-low
4 transition on the SDA followed by a high-to-low transition on the SCL;

5 a stop condition is indicated on the communication channel by a low-to-high
6 transition on the SCL followed by a low-to-high transition on the SDA; and

7 a state change in a slave of the communication channel is indicated on the
8 communication channel by a pulse on the SDA while the SCL is unchanged.

1 49. The communication channel of claim 48 wherein:
2 the pulse occurs while the SCL is high.

1 50. The communication channel of claim 48 wherein:
2 the state change comprises a rotation of the slave, said slave comprising a
3 display.

1 51. The communication channel of claim 50 wherein:
2 a master of the communication channel is a graphics circuit.

1 52. The communication channel of claim 48 wherein:
2 a bit value of one is indicated on the communication channel by the SDA
3 being high while the SCL has a low-to-high transition followed by a high-to-low transition;
4 and

5 a bit value of zero is indicated on the communication channel by the SDA
6 being low while the SCL has a low-to-high transition followed by a high-to-low transition.

1 53. The communication channel of claim 48 wherein:
2 the SDA is pulled up by a resistor; and
3 the SCL is pulled up by a resistor.

1 54. A communication channel between a master device and a slave device,

2 the communication channel comprising:

3 an I²C bus with a serial data line (SDA) and a serial clock line (SCL), wherein
4 the slave device is configured to indicate a monitor rotation to the master device by changing
5 a state on the SDA while the SCL is in a high state.

1 55. A communication channel between a master device and a slave device,

2 the communication channel comprising:

3 an I²C bus with a serial data line (SDA) and a serial clock line (SCL), wherein
4 the slave device is configured to indicate a state change of the slave device to the master
5 device by changing a state on the SDA while the SCL is in a high state.

1 56. A protocol for use with a two-line serial bus, comprising:

2 a start condition;

3 a stop condition;

4 a bit with a value of one;

5 a bit with a value of zero; and

6 a state change condition indicating to a master device connected to the serial
7 bus a changed state of a slave device connected to the serial bus.

1 57. The protocol of claim 56, wherein:

2 the start condition is indicated on the serial bus by a high-to-low transition on
3 a data line of the serial bus followed by a high-to-low transition on a clock line of the serial
4 bus.

1 58. The protocol of claim 56, wherein:

2 the stop condition is indicated on the serial bus by a low-to-high transition on
3 a clock line of the serial bus followed by a low to high transition on a data line of the serial
4 bus.

1 59. The protocol of claim 56, wherein:

the bit value of one is indicated on the serial bus by the data line being high while the clock line has a low-to-high transition followed by a high-to-low transition.

60. The protocol of claim 56, wherein:
the bit value of zero is indicated on the serial bus by the data line being low
while the clock line has a low-to-high transition followed by a high-to-low transition.

61. The protocol of claim 56, wherein:
the state change condition is indicated on the serial bus by a change on the
data line while the clock line is high.

62. A computer system comprising a graphics circuit and a display, the graphics circuit configured to generate display data and the display configured to display the display data, the display and the graphics circuit coupled via a serial bus comprising a serial data line and a serial clock line to exchange control signals, wherein:

a start condition is indicated by a high-to-low transition on the serial data line followed by a high-to-low transition on the serial clock line;

a stop condition is indicated by a low-to-high transition on the serial clock line followed by a low-to-high transition on the serial data line; and

a state change in the display is indicated by the display with a pulse on the serial data line while the serial clock line is unchanged.

63. The computer system of claim 62 wherein:
the pulse comprises a high-to-low transition followed by a low-to-high transition; and
the pulse occurs while the serial clock line is high.

64. The computer system of claim 62 wherein:
the graphics circuit comprises a master device and the display comprises a
slave device.

65. The computer system of claim 62 wherein:
the state change comprises a rotation of the display.

66. The computer system of claim 62 wherein:

4 the serial clock line is high when neither the graphics circuit nor the display is
5 driving the serial clock line.

1 67. The computer system of claim 62 wherein:

2 a bit value of one is indicated by the serial data line being high while the serial
3 clock line has a low-to-high transition followed by a high-to-low transition; and

4 a bit value of zero is indicated by the serial data line being low while the serial
5 clock line has a low-to-high transition followed by a high-to-low transition.

1 68. The computer system of claim 62 wherein:

2 the serial clock line is pulled up by a resistor; and

3 the serial data line is pulled up by a resistor.